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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/811,161
Filing Date: March 26, 2004
Appellant(s): SINHA ET AL.

John A. Miller
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 5/21/10 appealing from the Office action mailed 3/22/10.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2001/0049038	Dickman et al.	12-2001
2002/0082785	Jones et al.	6-2002
5,637,414	Inoue et al.	6-1997
4,839,574	Takabayashi	6-1989

Jung, J. Lee, Y., Joo, J and Kim, H.; Power Control Strategy for Fuel Cell Hybrid Electrical Vehicles, 2003 SAE World Congress; Paper 2003-01-1136. 3/3-6/03, Detroit, MI

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-15 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The limitations drawn to the power conditioning module, the controller and the load following algorithm are elements not described in the instant specification in a manner that enables one skilled in the art to make or use the invention. The amount of direction provided by the inventor is lacking description such that one of ordinary skill in the art would be able to make or use the claimed invention. The claimed invention hinges on a controller and an algorithm and a presence of working examples is lacking to provide guidance as how one would extrapolate the broad claim into a viable

invention. While a lack of examples alone does not show lack of enablement, this factor along with the lack of guidance and direction for how to make the algorithm or what components are envisioned for power condition module and the fuel cell controller, together provide evidence as to the question of enablement.

For example, the power conditioning module is illustrated in figure 2 as a general block and is described as a device that includes a DC/DC converter, a DC/AC converter and a battery. However, the power conditioning module also receives signals from the controller and knows how to draw current. What are the elements that perform these functions and how do they operate? How is the power conditioning module responsive to the draw current and the battery current? In other words what makes the module responsive other than it performing the basic function of converting the DC voltage to AC voltage as any DC/AC converter does. The instant disclosure does not describe how the elements are adapted to perform in the particular system with only a reasonable amount of experimentation (MPEP 2164.06(a)).

Regarding the controller, what elements or device constitute the controller? Instant figure 2 shows the fuel cell controller as a block. However, the specification provides no examples that illustrate an enabling description of what components create the controller and no indication as to “whether the parts represented by the boxes were ‘off the shelf’ parts or must be specifically constructed or modified.” (MPEP 2164.06(a) & 2164.06(c)). When the controller increases the available output power based on the battery current, how does this new available output power relate to the approach and

diverge thresholds and how is the load following algorithm affected or involved with the new available output power?

Regarding the "load following algorithm", the instant disclosure provides no method or means for the operation of the algorithm. Missing from the specification is any direction or suggestion as to what structure performs or runs the algorithm and how is the result of the algorithm translated to the other components of the system? Furthermore, no actual algorithm is presented in the instant disclosure. The graph of instant figure 3 shows the function that is performed but not the algorithm by which the function is performed. The graph does not allow one of ordinary skill in the art to realize the intended algorithm or provide the steps required to translate the function into an algorithm for an unknown controlling component. The instant disclosure also does not describe the parameters that go into the algorithm. What determines the approach threshold and the diverge threshold? How are these values calculated and what parameters are used to evaluate if the correct thresholds have been determined? While the fuel is controlled by the load following algorithm, what controls the oxidant? What factors constitute the maximum draw current I_maxFC and how does the load following algorithm define the maximum draw current signal?

The claimed invention and the instant description only provide the end function of an algorithm and not the algorithm or the device that performs the unspecified algorithm.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 7 & 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The limitations drawn to the fuel cell controller increasing the available output current if the battery sensor measures a predetermined battery current for a predetermined period of time is indefinite because it is unclear how this function works and fits in with the function of the algorithm. Since the battery sensor is always measuring the battery current, then the battery current is always measuring a predetermined current for a predetermined period of time and so the fuel cell controller is always increasing the available output of current. So if the fuel cell's available output is always being increased, how does the fuel cell controller respond to the fuel cell signal and operate the load following algorithm?

Claim Interpretation

The claims are drawn to a fuel cell distribution system, which is an apparatus. The fuel cell system comprises a controller that operates an algorithm. As discussed above, the controller is an unspecified device and the algorithm is both unspecified and the manner of its operation is also unspecified. An apparatus is defined by its structural limitations and the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from the prior art (MPEP 2114). The courts have held that “a general computer programmed to carry out a particular algorithm

crates a ‘new machine’ because a general purpose computer ‘in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from the program software.'" (Precedential opinion Ex Parte Catlin, Appeal 2007-3072). However, as noted above, no computer or algorithm is claimed or described in the instant specification and so no 'new machine' is created. As such, the operation of the apparatus is equivalent to the intended use of the apparatus and so while considered will not be given patentable weight.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5 & 10-13 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 2001/0049038 (Dickman).

Dickman teaches a fuel cell system with a power conditioning module (DC-DC converter) that applies conditioned current to a load. The power conditioning module is responsive to the draw current by using a fuel cell sensor to measure the draw current and the fuel cell voltage and generating a fuel cell signal that reports the fuel cell's current to the fuel cell controller, which is part of the control system (Abstract; Fig. 10; [0046, 0048, 0049, 0057, 0060 & 0064]). The controller sets the available output power from the fuel cell and defines the maximum current drawn from the fuel cell through the power conditioning module using communication links ([0034, 0035, 0040 & 0041]). As the upper threshold of the available power of the operating fuel cell stacks is reached, the controller increases the available power by increasing the number of operating fuel cells. When the power demand decreases below a lower threshold, the available power is decreased by reducing the number of operating fuel cells ([0046, 0051 & 0067]). In light of this teaching, it is implicit that when the draw power from the load does not increase over what the operating fuel cells can provide and does not decrease below what fewer fuel cells could provide, the available output power stays constant. Alternatively, it would be obvious to maintain the output power constant when the load does not vary.

Claims 10-12 are not further limiting to the apparatus since the claims are drawn to the intended use of the apparatus. It is held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from the prior art apparatus satisfying the claimed structural

limitations (MPEP 2114). Furthermore, the fuel cell system has an intended use in a motor vehicle ([0032]).

Claims 1-5 & 10-13 are rejected under 35 U.S.C. 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over US 2002/0082785 (Jones).

Jones teaches a fuel cell system comprising a fuel cell, a battery, a controller (60) and current and voltage sensors (40, 49). The fuel cell controller uses an algorithm to control the operation the fuel cell system (Fig. 1; Abstract, [0018, 0021, 0022, 0024, 0027 & 0028]). The voltage and current sensors inform the controller of the output voltage and current from the fuel cell as required by the load. A power conditioning module converts the fuel cell output into AC voltage and supplies the power to a load ([0052]). The controller increases the available power output when an approach threshold is reached and maintains a constant power when the required power is not longer near the approach threshold. In a similar manner power is decreased when a diverge threshold is reached and then a constant power is maintained when the required power is no longer near the diverge threshold ([0029-0038]). The maximum current draw and available output power are set by the number of fuel cells in the stack and the available reactants flowing to the cells.

Claims 10-12 are not further limiting to the apparatus since the claims drawn to the intended use of the apparatus. It is held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the

claimed apparatus from the prior art apparatus satisfying the claimed structural limitations (MPEP 2114).

Claim Rejections - 35 USC § 103

Alternatively, in light of the use claims having patentable weight, claims 1-5 & 10-13 are rejected under 35 U.S.C. 103(a) as obvious over US 2002/0082785 (Jones) in view of US 5,637,414 (Inoue).

The teachings of Jones as discussed above are incorporated herein.

Jones is silent to the controller setting a maximum draw current signal to the power conditioning module.

Inoue teaches a fuel cell system with a method of controlling the fuel cell system. The method of controlling the system includes a controller that communicates with a power conditioning module to evaluate and set the maximum available power output for the fuel cell (Abstract). A command signal from the controller to the power conditioning module sets the maximum available draw current that can be drawn from the fuel cell (Fig. 1; 2:25-3:30, 4:35-5:45). This controlling method prevents the deterioration of the fuel cell performance caused by gas shortages.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the control system with the load following algorithm of Jones with the method of controlling the power conditioning module to ensure the performance of the fuel cell system is not compromised by a fuel gas shortage.

Claims 6-9 & 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2001/0049038 (Dickman) in view of *Power Control Strategy for Fuel Cell Hybrid Electric Vehicles* (Jung).

The teachings of Dickman as discussed above are incorporated herein.

Dickman teaches a power management scheme with a battery assembly ([0048]). However, Dickman is silent to a battery voltage detector or battery current detector.

Jung teaches a method of controlling a fuel cell and battery system for a vehicle (Abstract). The fuel cell and the battery are electrically connected to distribute power to the load. A controller controls the power distribution and uses power from the fuel cell to recharge the battery when required (pg. 1, para. 4 & 5; pg. 2, para. 1 & 5; Fig.3). The battery power can be controlled by regulating the output current according to the output voltage. It is implicit or obvious to one of ordinary skill in the art that a teaching of regulating the current and the voltage is an implicit teaching of a current and voltage sensor that measures these values. Alternatively, it would be obvious to one skilled in the art to understand that monitoring the battery's state of charge (SOC) and regulating the current and voltage to use a current and voltage sensor. The SOC controller monitors either the voltage or the current of the battery (Fig. 5 & 7; Abstract; pg. 3, para. 2-5). While the fuel cell is operating the motor, if the battery requires charging, the controller sends the extra power to the battery to recharge the battery (Fig. 3c; pg. 2). Since SOC controller determines the battery current or voltage is below a

predetermined limit for some amount of time, the available power produced by the fuel cell is increased above what is required by the motor.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the battery assembly of Dickman with the current and voltage sensors and controller system taught by Jung to increase the system efficiency (Abstract).

Claims 6-9 & 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0082785 (Jones) in view of US 5,637,414 (Inoue) and further in view of *Power Control Strategy for Fuel Cell Hybrid Electric Vehicles* (Jung).

The teachings of Jones and Inoue as discussed above are incorporated herein.

Jones teaches a power management scheme with a battery assembly ([0048]). However, Jones is silent to a battery voltage detector or battery current detector.

Jung teaches a method of controlling a fuel cell and battery system for a vehicle (Abstract). The fuel cell and the battery are electrically connected to distribute power to the load. A controller controls the power distribution and uses power from the fuel cell to recharge the battery when required (pg. 1, para. 4 & 5; pg. 2, para. 1 & 5; Fig.3). The battery power can be controlled by regulating the output current according to the output voltage. It is implicit or obvious to one of ordinary skill in the art that a teaching of regulating the current and the voltage is an implicit teaching of a current and voltage sensor that measures these values. Alternatively, it would be obvious to one skilled in the art to understand that monitoring the battery's state of charge (SOC) and regulating

the current and voltage to use a current and voltage sensor. The SOC controller monitors either the voltage or the current of the battery (Fig. 5 & 7; Abstract; pg. 3, para. 2-5). While the fuel cell is operating the motor, if the battery requires charging, the controller sends the extra power to the battery to recharge the battery (Fig. 3c; pg. 2). Since SOC controller determines the battery current or voltage is below a predetermined limit for some amount of time, the available power produced by the fuel cell is increased above what is required by the motor.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the battery assembly of Jones with the current and voltage sensors and controller system taught by Jung to increase the system efficiency (Abstract).

Claims 6-9 & 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2001/0049038 (Dickman) in view of US 4,839,574 (Takabayashi).

The teachings of Dickman as discussed above are incorporated herein.

Dickman teaches a power management scheme with a battery assembly ([0048]). However, Dickman is silent to a battery voltage detector or battery current detector.

Takabayashi teaches a method of controlling the power distribution a fuel cell system that includes a battery. The power output of the fuel cell is increased in response to the battery voltage or current measurements (Abstract, 1:65-2:15). The controller measures and monitors the battery current and when a predetermined battery

current is measured for a predetermined period of time, the fuel cell power output is increased (Figs. 1 & 2; 3:45-60, 4:25-50). Instead of using the current as an indicating means, the battery voltage can be used (5:30-60). Increasing the fuel cell output in response to the current and voltage readings allows for a stable supply of output and extends the life of the battery (6:35-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the battery system of Dickman with the battery and fuel cell controlling means as taught by Takabayashi to increase the battery life.

Claims 6-9 & 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 2002/0082785 (Jones) in view of US 4,839,574 (Takabayashi).

The teachings of Jones as discussed above are incorporated herein.

Jones teaches a power management scheme with a battery assembly ([0048]). However, Jones is silent to a battery voltage detector or battery current detector.

Takabayashi teaches a method of controlling the power distribution a fuel cell system that includes a battery. The power output of the fuel cell is increased in response to the battery voltage or current measurements (Abstract, 1:65-2:15). The controller measures and monitors the battery current and when a predetermined battery current is measured for a predetermined period of time, the fuel cell power output is increased (Figs. 1 & 2; 3:45-60, 4:25-50). Instead of using the current as an indicating means, the battery voltage can be used (5:30-60). Increasing the fuel cell output in

response to the current and voltage readings allows for a stable supply of output and extends the life of the battery (6:35-50).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the battery system of Dickman with the battery and fuel cell controlling means as taught by Takabayashi to increase the battery life.

(10) Response to Argument

First, it is noted that appellant's opening title "Appellant's Third Appeal Brief" is not entirely correct. While appellant has filed three Appeal Briefs, the second Appeal Brief filed 12/8/09 was presented after appellant filed a Petition on 10/12/09. Appellant chose not to wait for the Petition decision of 12/16/09 and instead filed a second Appeal Brief in the interim. When the Petition was granted, a corrected Office Action was required to be sent out with the proper signatures as petitioned by appellant. So while Appellant has filed three Appeal Brief's, only two are proper. The first Appeal Brief was filed 5/4/09, which prompted the reopening of the application. Subsequently the current Non-Final Office Action was filed and now stands appealed with the second proper Appeal Brief.

<u>A. Claims 1-15 rejected under 35 USC 112 1st Enablement</u>

Appellant argues because the rejection is seen as untimely, it is unreasonable. While the rejection was not presented earlier in examination, due to appellant's

arguments presented through examination and in trying to better understand the invention, the issue of enablement was uncovered and so presented. Timing is not a factor that corrects the issue that appellant has not provided enablement for the claimed invention.

Appellant argues the instant specification is supported by pointing to the instant specification for support, specifically, figure 2 and paragraph [0025], "The current controller 56 also provides a current draw signal I_draw to the power conditioning module 44 on line 60...thus, the power conditioning module 44 knows to only draw as much current from the fuel cell module 42 as the fuel cell module 42 is currently able to produce, and knows to take any further power demanded by the loads 50 from the battery."

As discussed above, the component 56 in figure 2 is shown as a square box that is suppose to represent both the fuel cell controller and the current controller and yet no description or example is given as to what components would be required to meet both these functions. The power conditioning module somehow “knows to" only draw so much current and then "knows to" fill further power demands from the battery. However, no example or direction is provided to illustrate what components or methods would enable the power conditioning module, not the controller, to "know to" do each of these processes. The state of the prior art does not enable one of ordinary skill in the art to know what components are intended by the inventor to make the claimed invention. Furthermore, if the components are off the shelf the disclosure is silent to

enabling one of ordinary skill in the art how to assemble the all the elements together to make the invention.

Appellant alleges figure 3 supports the claimed load following algorithm limitation which is controlled by controller 56. The working mechanism that is controller 56 is an unknown element and the device intended by the inventor is not exemplified or discussed in the instant disclosure. Appellant suggests evidence of the known controller and load following algorithm by pointing to paragraph [0024], which states in part, "controller 56... provides a command I_reqFC to the fuel cell module on line 58 that instructs the fuel cell module 42 to generate a certain amount of power based on a load following algorithm discussed below." Yet, no algorithm is provided and no parameters or specifics for setting up the algorithm are provided. Appellant points to paragraphs [0027] and [0028] for the approach threshold and diverge thresholds. Neither of these regions is discussed in a manner that details what parameters or amounts or functions are used to derive these regions or how one of ordinary skill in the art would expect to replicate the regions. Paragraph [0027] states that when “most of the available current from the fuel cell" is used, the controller increases the available power output. What constitutes "most of the available current"? Does using most of the current require a time frame? Similar specifics are missing from the diverge threshold region.

For the reasons stated above through the Wands analysis, a reasonable basis for questioning the adequacy of the disclosure is established. Appellant has not provided any evidence or support for refuting the rejection other than by pointing to the instant specification and indicating that the missing elements are well known in the art,

which no evidence has been provided to support. Furthermore, even if the missing individual elements are well known in the art, the instant disclosure has not provided adequate direction for assembling the individual components into the claimed invention. No support in the instant specification is provided for a new machine.

B. Claims 7 and 14 rejected for indefiniteness

Appellant argues because the rejection is seen as untimely, it is unreasonable. While the rejection was not presented earlier in examination, due to appellant's arguments presented through examination and in trying to better understand the invention, the issue of indefiniteness was uncovered and so presented. However, timing is not a factor that corrects the issue of indefinite claims.

Appellant argues the rejection is irrational because any power generating device that is capable of always increasing available output seems unrealistic. First, as correctly described by appellant, the claimed limitations provide an unrealistic situation that is unclear to one of ordinary skill in the art and so the meets and bounds of the claim language cannot be determined. Second, the fact that appellant has to "put another way" the claim language also shows the claim as indefinite since the language should be definite as claimed, not restated in other words. Third, support for the rewording of the claim appears to be missing from the instant specification. Since appellant has illustrated a need to rewrite and explain the meaning of the claims and illustrated that the meaning of the claims are unrealistic, the claims do not point out and

distinctly claim the inventive subject matter and the meets and bounds of the claim language are not clear. Therefore the claims are held as indefinite.

Claim Interpretation

As stated at the beginning of the Office Action, a claims analysis was performed in light of the instant disclosure and an interpretation of the claim language was provided. Namely, no computer is claimed or described instant disclosure and no programming is claimed or described in the instant disclosure. *In re Catlin* established that both of these components were necessary to create a 'new machine' for a structure to perform a function, same as claimed. While *In re Catlin* was geared toward means-plus-function language, the currently claimed invention is similar in that it is directed to a controller performing a function. In *Aristocrat*, the court found the language "the game control means being arranged to pay a prize when a predetermined combination of symbols s displayed in a predetermined arrangement of symbol positions selected by a player" as only describing the function to be performed and not the algorithm by which it is performed. So the operation of the apparatus is functional language and amounts to the intended use of the apparatus and as long as the apparatus is capable of operating in the claimed manner it meets the claimed invention. While intended use recitations and other types of functional language are not entirely disregarded, the intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Claims

directed to apparatus must be distinguished from the prior art in terms of structure rather than function (MPEP § 2114).

Also, it is noted that even appellant points out the claimed invention has an operational method included in the claimed apparatus (Brief, pg. 29 1st paragraph). As neither the claims nor the instant description has included language that would enable the meaning of a 'new machine', these operating means are not further limiting to the apparatus.

<u>C. Claims 1-5 and 10-13 rejected under 35 USC 102/103 over Dickman</u>

Appellant alleges Dickman does not teach a fuel cell current sensor that measures the draw current of a fuel cell. At least paragraph [0060] of Dickman teaches the fuel cell current being measured and the fuel cell being controlled based on the sensor values. As discussed earlier, the control and operation of the fuel cell based on the algorithm is seen as intended use and therefore not further limiting to the claimed apparatus. Alternatively, Dickman anticipates or renders obvious the claimed operation of the fuel cell system. Appellant points out that Dickman teaches turning on and off fuel cells and then states that the controller of Dickman is clearly not utilizing a load following algorithm that is setting the available output power of a fuel cell. However, by turning fuel cells on and off the available output power of the fuel cell stack and the individual fuel cells is set. As no actual algorithm is claimed, Dickman’s teaching of increasing the available power and decreasing the available power through increasing and decreasing the number of operational fuel cells in the stack in response to a load,

meets the general claim of a load following algorithm. Regarding the claimed setting or defining of the maximum current draw signal, when Dickman teaches a signal is sent by the power conditioning module to change the number of fuel cells by adding more when more power is required and decreasing the number when less power is required, the maximum current draw is set and defined.

Appellant alleges no discussion is provided as to what elements constitute the controller and power conditioning module taught by Dickman and then points to paragraphs [0046, 0048, 0049, 0057 and 0064]. Appellant argues no teaching is found in these paragraphs that the elements of Dickman are interconnected and function as the claimed invention. Appellant's argument amounts to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. Paragraphs [0034, 0035, 0040, 0041, 0051, 0060 & 0067] are also cited in the Office Action as pertaining to the controller and power conditioning module and teaching the claimed invention. The power conditioning module is taught in at least paragraphs [0048, 0060], the controller is taught in at least paragraphs [0046, 0057, 0067] and the maximum and minimum currents and 'load following algorithm are taught in at least paragraphs [0034-0035, 0040, 0064, 0067].

Appellant alleges the previous discussions do not articulate how all the elements taught by Dickman meet the claimed limitations. The operation of the load following algorithm is not considered limiting to the apparatus claimed. Alternatively, the reasoning and support for Dickman rendering the claimed invention anticipated or

obvious has been clearly laid out. All prior art arguments presented by appellant regarding the teachings of Dickman have been answered. Appellant's statement that “the Examiner has not articulated how these elements operation a load following algorithm..." is not supported with any specific examples or references to missing language from the prior art and so the argument amounts to general allegations. Dickman teaches using a fuel cell controller and power conditioning module by using a load following algorithm. The load following algorithm adjusts the available power and maximum power available through the starting and stopping of fuel cells, which in turn increases or decreases the available power. Support for this teaching is found in the sections of Dickman already cited.

Regarding the arguments of claim 13, the operation of the fuel cell is seen as intended use. Alternatively, at least paragraph [0062] teaches the element of approach and diverge thresholds. When a load demand falls to a value substantially less than an available power operating amount, the available power output is decreased. So the diverge threshold is equivalent to the value substantially less than the available power operating amount. When more power is required another fuel cell is brought on to operation. Therefore, an approach threshold region exists since at some point the next fuel cell is made operational and just before the fuel cell is turned on, that is the approach threshold region.

Regarding claims 10-12, the independent claim 1 is directed to a fuel cell system and claims 10-12 are only directed to the intended use of the fuel cell system and therefore are not further limiting to the fuel cell system itself. The additional elements

recited in claims 10-12 are directed to further limiting the intended use of the fuel cell system and are not further limiting to the structure of the fuel cell system. Furthermore, Dickman teaches the use of the fuel cell system with a vehicle and heating and air conditioning systems are at least obvious as part of a vehicle system.

D. Claims 1-5 and 10-13 rejected under 35 USC 102/103 over Jones

As discussed above, the operational limitations of the fuel cell are seen as intended use and a method of operating the fuel cell system. While intended use recitations and other types of functional language are not entirely disregarded, the intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art.

Appellant argues Jones does not teach a command signal applied to a fuel cell that sets the available output power from the fuel cell. Jones teaches in paragraphs [0027-0028], a controller monitors the current drawn from the fuel cell and matches the output of the fuel cell to the load via communication lines. So a command signal is applied to the fuel cell that sets the available output power from the fuel cell. Jones defines a maximum current that can be drawn from the fuel cell by setting the amount of reactant supplied to the fuel cell. For a given amount of reactant, the amount of current that can be drawn from the fuel cell is limited and a maximum draw current is set.

Appellant only points to paragraphs [0029] and [0038] of Jones for teachings of the load following algorithm; however, Jones teaches the claimed load following algorithm in paragraphs [0029] through [0038]. As taught in these paragraphs and as

stated by appellant, Jones teaches increasing and decreasing the fuel supplied to the fuel cell through a command signal that is in response to the fuel cell sensor measuring the fuel cell draw current. Controlling the fuel supply to the fuel cell sets the available output power of the fuel cell and defines the maximum draw current from the fuel cell. The fuel supply is set according to the load demand and so the claimed load following algorithm that defines a command signal applied to a fuel cell that sets the available output power from the fuel cell and defines a maximum draw current to be drawn from the fuel cell is taught by Jones.

Appellant argues the controller 60 of Jones is not coupled to the voltage regulator or inverter. This arrangement is not claimed. Appellant's state that Jones does not teach defining the maximum available power by the number of fuel cells in the stack or the available reactants. This is an inherent fact of fuel cells and does not need to be taught by Jones and has not been disputed by appellant. Each fuel cell and fuel cell stack can only produce so much current for a given amount of voltage and a given amount of reactant. Therefore, Jones' fuel cell stack can only produce a limited amount of current and voltage for each of the reactant amounts set and the fuel cell stack is again limited to a maximum amount for that reactant amount.

Appellant argues a device in Jones has not been articulated to meet the claimed power conditioning module. The claimed power conditioning module is required to be responsive to the draw current, condition the draw current and apply the conditioned draw current to the load. As discussed in the above rejection, the power conditioning module of Jones includes the voltage regulator and inverter (30, 33). The power

conditioning module taught by Jones, conditions the draw current supplied to it from the fuel cell and so is also responsive to the draw current and then the module supplies the conditioned draw current to the load. As such, the power conditioning module is clearly taught by Jones.

Regarding claims 10-12, the independent claim 1 is directed to a fuel cell system and claims 10-12 are only directed to the intended use of the fuel cell system and therefore are not further limiting to the fuel cell system itself. The additional elements recited in claims 10-12 are directed to further limiting the intended use of the fuel cell system and are not further limiting to the structure of the fuel cell system.

E. Claims 1-5 and 10-13 are rejected under 35 USC 103 over Jones in view of Inoue.

As discussed above, Jones does implicitly or inherently teach setting the available power output and defining a maximum current draw by the controlling the amount of fuel allowed to react with the fuel cell. The amount of fuel supplied is dependent on the current draw requirements of the load so the available power output and maximum current draw are set and defined by a controller using a load following algorithm.

Appellant argues the obviousness rejection of Jones in view of Inoue seems to contradict the anticipation/obviousness rejection of Jones alone. This is incorrect since as mentioned previously, the manner of operating the fuel cell is not considered further limiting to the apparatus since a 'new machine' has not been properly claimed or

described in the instant specification. However, if the operation is seen as further limiting then the operation taught by Jones implicitly or inherently sets available output power and maximum current draw signals though the amount of gas sent to the fuel cell. The statement in the 103 rejection is “Jones is silent to the controller setting a maximum draw current signal to the power conditioning module." Since this element is implicitly and inherently taught, Jones is silent to this statement. If setting the maximum draw current is seen as different then the maximum available for a given supply of reactant and the natural limit available from a fuel cell, then the prior art of Inoue is supplied to show this claimed element is also well known in the art.

Appellant argues the references of Jones and Inoue individually when the rejection is based on the combined teachings of the prior art. Furthermore, appellant’s arguments amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references. Jones is clearly relied on for teaching the approach and diverge thresholds that appellant points out is missing from Inoue. Both references teach using a supplying a power conditioning module that conditions a draw current from the fuel cell and applies a conditioned draw current to a system load. Jones conditions the current with the voltage regulator and inverter (30, 33) and Inoue conditions the current with the output correction means (10) and inverter (3). These elements and the operation of these elements are clearly laid out in passages cited in the prior art and in the rejections presented.

Appellant states the cited sections of Inoue “do not teach a controller in communication with a power conditioning module that sets the maximum power output of a fuel cell and the maximum available draw current from the fuel cell, and the Examiner has not specifically identified where these elements are in these sections of Inoue.” Citing from the sections pointed to in the Office Action, Inoue teaches using the power conditioning module to condition the draw current “an output control regulator for controlling the output current of the inverter" (2:40-45) and to set the maximum available draw current and maximum power output "an available output computing unit for computing a current value corresponding to the maximum available output value of the fuel cell" (3:10-18). These are only a few of the examples cited in the reference that illustrate how Inoue and Jones obviate the claimed invention.

Appellant submits that Inoue <u>does</u> calculate the maximum available output power but bases it on the fuel gas available and not responsive to a system load. It is well known in the art that the supply and consumption of fuel in the fuel cell is dependent on the load requirements. Furthermore, Jones clearly teaches changing the fuel amount to match the load and Inoue sets the maximum output power based on the fuel amount. The combination sets the available output power and the maximum output power based on the load.

Appellant argues Inoue fails to teach conditioning the battery current. However, as articulated in the rejection, Jones teaches conditioning the battery current and using the battery current to supplement the fuel cell power. So any conditioning applied to the fuel cell current is applied to the battery current as taught by Jones.

F. Claims 6-9, 14 and 15 are rejected under 35 USC 103 over Dickman in view of Jung.

Regarding appellant's arguments against Dickman, each of the conditioned current to the load, the fuel cell current meter, which inherently measures current, that reports the fuel cell current and a controller are all taught as cited throughout the discussion.

Appellant argues Jung does not teach a battery voltage detector or battery current detector. First, appellant has not provided any pointed errors in the rejection of the claims as rejected over Dickman in view of Jung. Appellant has only broadly stated that the reference do not teach the claimed limitations. Second, Jung teaches monitoring the state of charge (SOC) of the battery and the charge of a battery comprises the amount of voltage and the amount of current available in a battery. In order to monitor the status of the voltage and current, a voltage and current detector is required. So Jung either implicitly teaches using battery voltage or current detectors or it would be obvious to one of ordinary skill in the art at the time of the invention to use the detectors to monitor the SOC of the battery as taught by Jung.

G. Claims 6-9, 14 and 15 are rejected under 35 USC 103 over Jones in view of Inoue and Jung.

Appellant argues “Jung fails to teach, *inter alia*, a command signal applied to a fuel cell that sets the output power from the fuel cell, and does not define a maximum

current draw signal applied to a power conditioning module in response to a load that defines a maximum current that can be drawn from the fuel cell." The rejection is based on the combined teachings of the prior art and the Jung reference was not relied upon for what appellant pointed out was missing from Jung. This element is taught by Jones. Also, it appears the inclusion of the Inoue reference in the title of this rejection was a typographical error and should not have been included. As the body of the rejection does not include any reference to the teachings of Inoue, the inclusion of the reference in the title is obviously a typographical error.

H. Claims 6-9, 14 and 15 are rejected under 35 USC 103 over Dickman in view of Takabayashi.

Appellant argues the teachings of a battery voltage and current detector are not found in the Takabayashi reference. As pointed out, the passages "detecting the energy stored in the battery" (2:5-10) and "detected by the battery current detector 10" (3:55-60) and "the stored energy can be detected by detecting the voltage between the terminals of the battery 8 by using a suitable voltage detector" (5:38-41) teach a battery current detector and voltage detector. The reference is combinable with the teachings of Dickman for reasons of record.

I. Claims 6-9, 14 and 15 are rejected under 35 USC 103 over Jones in view of Takabayashi.

Appellant argues the teachings of a battery voltage and current detector are not found in the Takabayashi reference. As pointed out, the passages “detecting the energy stored in the battery” (2:5-10) and “detected by the battery current detector 10" (3:55-60) and “the stored energy can be detected by detecting the voltage between the terminals of the battery 8 by using a suitable voltage detector" (5:38-41) teach a battery current detector and voltage detector. The reference is combinable with the teachings of Jones for reasons of record.

<u>Conclusion</u>

Claims 1-15 are not enabled for the reasons of record. The written description lacks an adequate amount of guidance and direction to enable one to make or use the claimed invention without an undue amount of experimentation. No working examples are provided to illustrate the claimed invention, the components that make up the invention or how the individual components would be put together to form the claimed invention. Claims 7 and 14 are indefinite because as illustrated by appellant, operating the fuel cell in the manner claimed produces a unrealistic operation and the claims require reiterating in other words to explain the meaning, which do not appear supported in the instant specification. Claims 1-5 & 10-13 are anticipated or alternatively obvious over the teachings of Dickman and Jones since the operation of the fuel cell does not further limit the apparatus or alternatively the fuel cell's operation is taught or obvious in view of the teachings of the prior art. Claims 6-9, 14 and 15 are obvious in view of the cited prior art because in each of the rejections under combined

teachings, all of the claimed limitations are taught and the reasons for combination are taught. Appellant has not provided any pointed arguments to either missing elements or the reasons for combination. Appellant's arguments amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Keith Walker/

Conferees:

/PATRICK RYAN/

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/Dah-Wei D. Yuan/

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